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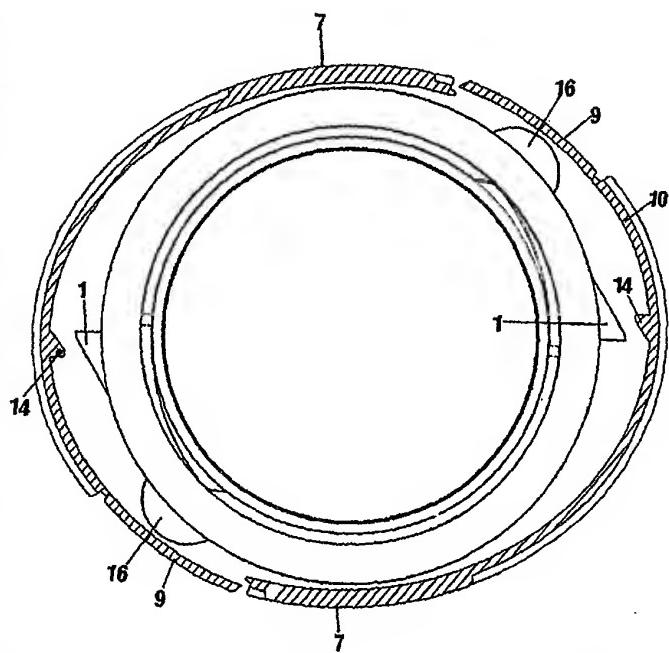
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[Continued on next page]

- (54) Title: SCREW CAP OF THE "SQUEEZE AND TURN" TYPE



(57) Abstract: The present invention concerns a child-resistant screw cap (6) for a container (22), the cap (6) having a skirt (10) shaped as a body of revolution and an internal skirt (15) with an internal screw thread (12) for interacting with a screw thread (23) on a radial wall (3) of the neck (4) of the container (22), where an inner side (13) of the said skirt (10) is designed with at least one barb (14), which can be brought to engage at least one barb (1) provided at an outer side of the radial outermost wall (5) of the neck (4) of the Container (22), the bars (1, 14) being designed and disposed complementarily so that they mutually engage in pairs when the container (22) is closed with the purpose of preventing that the screw cap (6) can be screwed off, the screw cap (6) being equipped with two marked, diametrically opposed areas (7) that are disposed in relation to the said barb (14) so that the transverse measurement of the skirt (10) opposite to the barb (14) is increased so much that the engagement between the bars (14) and (1) stops by pressure action on the areas (7) so that the cap (6) can be

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screwed off, the cap (6) including a sealing means, where the sealing means consists of at least one wall element (9) of the skirt (10), where the wall element (9) is connected with the said skirt (10) by means of a number of fracture indication lines (8) or fracture indication parts (8a) connecting the edges of the wall element (9) with the skirt (10).



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SCREW CAP OF THE "SQUEEZE AND TURN" TYPE

Scope of the Invention

The present invention concerns a child-resistant screw cap for a container, the cap having a skirt shaped as a body of revolution and an internal skirt with an internal screw thread for interacting with a screw thread on a radial wall of the neck of the container, where an inner side of the said skirt is designed with at least one barb, which can be brought to engage at least one barb provided at an outer side of the radial outermost wall on the neck of the container, the barbs being designed and disposed complementary so that they mutually engage in pairs when the container is closed with the purpose of preventing that the screw cap can be screwed off, the screw cap being equipped with two marked, diametrically opposed areas that are disposed in relation to the said barb so that the transverse measurement of the skirt opposite to the barb is increased so much that the engagement between the barbs and stops by pressure action on the areas so that the cap can be screwed off, the cap including a sealing means.

Background of the Invention

US patent 4,117,945 describes an example of such a child-resistant screw cap that may be screwed off a container after the skirt has been compressed or squeezed to an oval cross-section in such a way that the internal transverse measurement of the skirt is increased so much on the spot where the barbs of the skirt are placed so that the barbs on skirt and neck, respectively, go clear of each other when screwing off the cap.

The screw cap can be screwed on again and the respective barbs are passing each other without the skirt of the screw cap is to be pressed into an oval shape. Then the barbs can prevent again that the cap is turned in the opposite direction until the two oppositely directed areas of the skirt in the mentioned way are pressed against each other again in order to bring the barbs out of engagement.

Lack of knowledge of this manual form of compressing the screw cap is a prerequisite for the screw cap to be regarded as child-resistant.

However, it is not possible to see if the cap-provided container has been opened. The container may have been opened and the contents be manipulated before sale. It is also a possibility that a child accidentally could have been able to open the container.

5 **Purpose of the Invention**

The purpose of the present invention is to indicate a child-resistant screw cap which is to be manipulated in a particular way before it is screwed off a container.

This purpos is attained with a child-resistant screw cap of the kind described in the
10 preamble of claim 1, where the sealing means consists of at least one wall element of the skirt, where the wall element is connected with the said skirt by means of a number of fracture indication lines or fracture indication parts connecting the edges of the wall element with the skirt.

15 **Description of the Invention**

The invention concerns a child-resistant screw cap of the "Squeeze and Turn" type for a container, where the screw cap may only be screwed off by applying a compressive force, whereby the screw cap is deformed wholly or partially so that projections and/or recesses on the screw cap and the container are released.

20 The sealing means indicates if a sealing has been broken. The sealing has not been broken if the sealing means is still entirely intact and fastened to the skirt. On the contrary, the sealing has been broken if the sealing means has been loosened from the skirt since the wall element breaks the fracture indication lines or the fracture indication parts by pressure action and is thus loosely attached to the skirt. In both cases it clearly appears if the screw cap has been screwed off the container.

25 The screw cap is equipped with two marked diametrically opposed, preferably reinforced areas for receiving pressure or squeezing force. The areas are disposed so that in relation to the barbs on the opposite side of the skirt of the cap, the transverse measurement of the skirt is increased on the spot where the barbs of the skirt are placed, so that these are brought out of engagement with the barb of the neck when the

skirt is pressed to an oval shape by the two parties being pressed against each other, whereby the cap may be screwed off.

The child-resistant screw cap according to the invention is suitable in a preferred embodiment, as the wall element internally includes a barb which by pressure and squeezing and/or turning of the cap interacts with a barb which is disposed on the wall so that the wall element is loosened, and the wall element and the barb are disposed mutually so that the wall element is loosened before barb and barb are passing each other when the areas are subjected to pressure.

10

If a wall element is loosened or entirely removed, it is a sign that the container has been opened or attempted to be opened.

15

In an alternative embodiment, the child-resistant screw cap according to the invention may furthermore be suitable, as the container neck is provided with at least one projection ensuring that the wall element is loosened when the areas are subjected to pressure.

20

Hereby it is also possible to see if the container has been opened or attempted to be opened.

25

Furthermore, the child-resistant screw cap according to the invention may be suitable in a further embodiment, as the skirt is connected with a securing ring at its bottom edge along a fracture indication line or by fracture indication parts that are disposed mutually spaced apart, the securing ring being provided with at least one barb that interacts with at least one barb designed as a stop and disposed at the external side of the radially outermost wall on the neck.

30

When the cap is screwed off the container, the interacting barbs are brought into contact with each other, whereby the securing ring is torn loose, indicating that the container has been opened or attempted to be opened.

The child-resistant screw cap according to the invention is furthermore suitable in a preferred embodiment, as the screw cap in the second skirt is provided with a third concentric skirt which is disposed and designed so that its external side bears sealingly against the inner side of the container neck in connection with the first stage of the 5 screwing off of the screw cap.

Hereby is achieved that the lid also can function as a plug for closing the container neck in connection with screwing the cap off and on. This closure is more efficient than a closure where only the underside of the cap is instantaneously brought sealingly 10 in contact with the upper edge of the neck at the end of the screwing on.

Thereby is effectively avoided that the contents of an almost closed container as well as the contents of a completely closed container comes in contact with the ambient air and possible harmful influence stemming from the air, e.g. by action of moisture.

15 With this construction of the container/screw cap is achieved a new combination of a child safety device, a tamper-evidence sealing and a sealing cone, which is interesting as there are no screw caps of the type "squeeze and turn" with visible sealing and internal sealing.

20 The visible sealing is typically hidden in the container as a film that simultaneously functions as sealing, implying that the container in case of breakage of the film is no longer tight.

25 Finally, the child-resistant screw cap according to the invention is suitable in a preferred embodiment as the barbs at the opposite sides of their respective contact surfaces which are located in mainly radial planes have inclined faces forming an acute angle with the adjacent contact surfaces.

30 Hereby is achieved that the barbs are forced to slide past each other on their inclining surfaces, whereby their contact surfaces are faced against each other when the cap is screwed securely on the container. Then the barbs can prevent the container from be-

ing opened unhindered without the two marked areas of the skirt being pressed against each other at first. The cap is thus made child-resistant again.

Short Description of the Drawing

5 In the following, the present invention is explained with reference to the Figures, where:

- Fig. 1A shows a container with a cap which is provided with a sealing means consisting of a four-edged wall element in the wall of the skirt;
- 10 Fig. 1B shows the container without a cap but with a collar having a screw thread and a barb, the collar being pressed tightly against the container;
- Fig. 1C shows the container cap where an opening in the skirt indicates that the sealing means has been broken;
- 15 Fig. 2A shows the container cap with a four-edged wall element serving as sealing means;
- Fig. 2B shows the cap as seen from below;
- Fig. 2C shows the container neck with a radial innermost and radial outermost wall;
- Fig. 2D shows the neck as seen from below;
- Figs. 3A-C shows the container neck from above in a section just under the top plate
- 20 of the cap:
- in Fig. 3A before screwing off the cap,
 - in Fig. 3B at the beginning of screwing off where the sealing wall part is loosened, and
 - in Fig. 3D at the last stage of the screwing off;
- 25 Fig. 4A shows the container cap with a securing ring fastened to its lower edge;
- Fig. 4B shows the cap as seen from below;
- Fig. 4C shows the container neck consisting of a collar that can be pressed securely onto the container;
- Fig. 4D shows the collar from below; and
- 30 Fig. 5A shows the container cap with securing ring fastened to the lower edge of the cap by means of interspaced fracture indication parts;
- Fig. 5B shows the cap from above when its top plate has been cut away; and

Fig. 5C shows a section in the container with neck and screwed on cap along a radial plane.

Detailed Description of the Invention

5 In Figure 1, the centre view shows the neck 4 of the container 22 having a radial innermost wall 3 and a radial outermost wall 5. The external side of the radially innermost wall 3 carries a screw thread 23 that interacts with a screw thread 12 at the internal side of the second skirt 15 of the cap 6 (see Fig. 2). Furthermore, on the radially outermost wall 5 of the neck 4 is seen a barb 1 formed therein which through interaction with a barb 14 on the inner side 13 (shown in Fig. 2) of the first skirt 10 prevents the cap 6 from being turned in the opening direction.

10
15 On the view to the left, the container 22 is seen with cap 6 screwed on. The cap 6 has a sealing means in the shape of a four-edged wall element 9 which is fastened to the first skirt 10 of the cap 6 by fracture indication lines 8 along the edges of the wall element 9. The fracture indication lines 8 can be substituted by interspaced fracture indication parts 8a that connect the edges of the wall element 9 with the skirt 10.

20 On the view to the right the cap 6 is seen where the wall element 9 is loosened and leaves an opening in the skirt 10, indicating that the sealing has been broken.

25 In Fig. 2 is seen two diametrically opposed, marked areas 7 in the skirt 10 and two diametrically opposed barbs 14 at the inner side of the skirt 10 and displaced 90°. At the external side of the radially outermost wall 5 of the neck 4, one of the barbs 1 is seen.

30 When the sealing on a container 22 is not broken, the two above mentioned barbs 14 and 1 are in such positions that they, after abutting on each other, prevent the cap 6 from being screwed off the container 22.

By pressing the two marked areas 7 against each other, the distance between the marked areas 7 is reduced, while the distance between the diametrically opposed barbs

14 at the inner side of the skirt 10 is increased. This causes the barbs 14 at the inner side of the skirt 10 to pass the barbs 1 on the neck 4 when the cap 6 is screwed off the container 22.

5 Besides, at the external side of the outermost wall 5 of the neck 4 is seen a third barb 2 that interacts with a barb 11 at the inner side of the wall element 9. When the cap 6 is screwed off the container 22, the barb 2 on the neck 4 retains the barb 11 on the wall element 9, and the cap is loosened, whereby the skirt 10 is opened or exposed, indicating that the sealing has been broken.

10

In the first skirt 10, the cap 6 has a second skirt 15, the internal side of which carries the screw thread 12 which interacts with the screw thread 23 carried by the external side of the radially innermost wall 3 on the neck 4.

15 In Fig. 3, the skirt 10 is seen from above in a sectional view. The skirt 10 has two marked areas 7. By pressing these areas 7 against each other, the skirt assumes an oval shape. As mentioned in connection with Fig. 2, this is causing that at least one projection 16 provided on the neck 4 loosens or ejects a wall element 9, and that the barbs 14 and 1 during simultaneous screwing off of the cap 6 go clear of each other with consequent effect.

20 In Fig. 4 is seen that the cap 6 with its skirt 10 to the lower edge of which a securing ring 18 is fastened along a fracture indication line 24 or by means of interspaced fracture indication parts 17, the securing ring 18 being provided at its inner side with at least one barb 19 that interacts with at least one barb 20 formed as stop and provided at the external side of the neck 4.

25 The first time the cap 6 is attempted to be turned off a newly purchased container 22, the securing ring 18 is loosened entirely or partially by way of the radial compression of the cap, the interaction of the barb 19 and the stop 20. The partially loosened, completely loosened or torn off, respectively, securing ring 18 then indicates that the container 22 has been opened or attempted to be opened.

In Fig. 5 is seen the securing ring 18 which is fastened to the lower edge of the skirt 10 by means of fracture indication parts 17 as mentioned above.

5 Furthermore, provided in the second skirt 15 is seen a third concentric skirt 21, the external side of which bears sealingly against the internal side of the radially innermost wall 3 on the neck 4 of the container 22, when the cap 6 is in its partially or fully screwed on position. The cap 6 thereby functions as a plug that effectively can close the container 22.

10

Finally it appears that the barbs 14 at the inner side of the skirt 10 and the barbs 1 on the neck 4 at the opposite side of their respective contact surfaces that are situated in mainly radial planes have inclined surfaces forming an acute angle with the adjacent contact surfaces, causing that the barbs are forced to slide past each other on their inclined surfaces, whereby their contact surfaces are turned against each other when the cap 6 has been screwed securely on the container 22.

15

Then the barbs may again prevent that the container 22 is opened without the two marked areas 7 of the skirt 10 being pressed against each other at first. The cap 6 is thus child-resistant again.

20

The invention is not limited to the embodiments indicated here, as other embodiments may be manufactured within the frames of the invention.

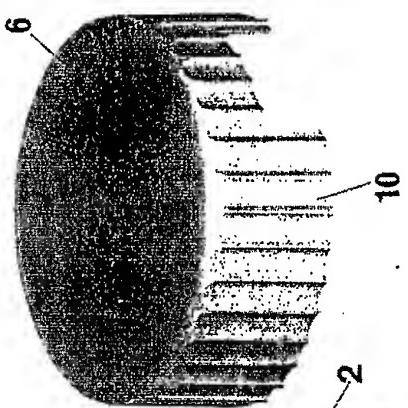
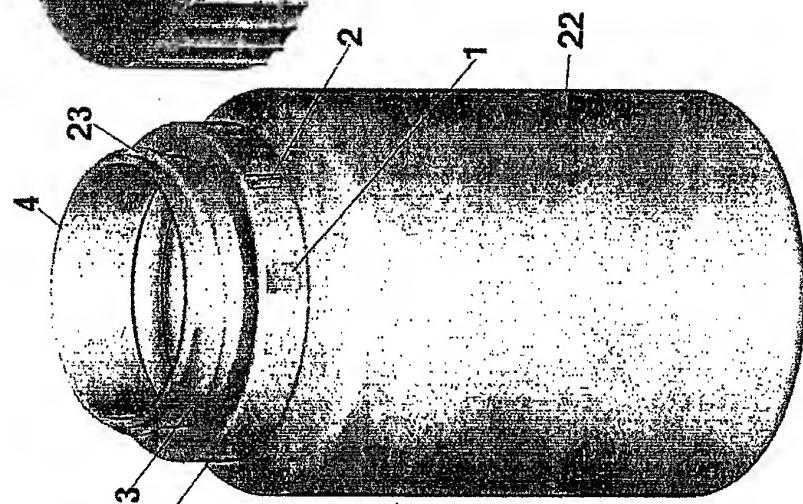
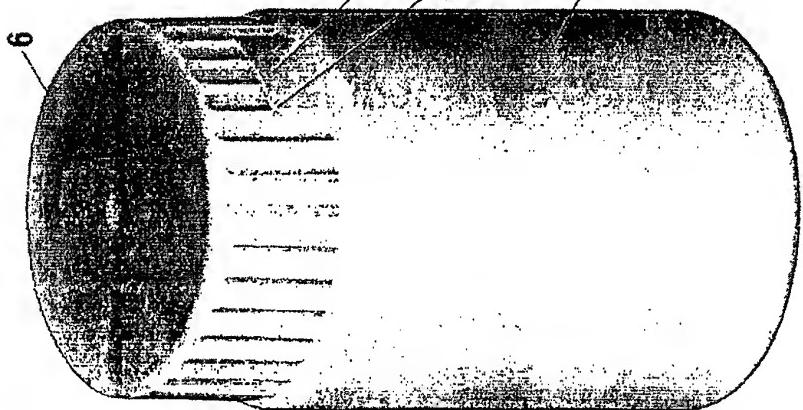
Claims

1. Child-resistant screw cap (6) for a container (22), the cap (6) having a skirt (10) shaped as a body of revolution and an internal skirt (15) with an internal screw thread (12) for interacting with a screw thread (23) on a radial wall (3) of the neck (4) of the container (22), where an inner side (13) of the said skirt (10) is designed with at least one barb (14), which can be brought to engage at least one barb (1) provided at an outer side of the radial outermost wall (5) on the neck (4) of the container (22), the barbs (1, 14) being designed and disposed complementarily so that they mutually engage in pairs when the container (22) is closed with the purpose of preventing that the screw cap (6) can be screwed off, the screw cap (6) being equipped with two marked, diametrically opposed areas (7) that are disposed in relation to the said barb (14) so that the transverse measurement of the skirt (10) opposite to the barb (14) is increased so much that the engagement between the barbs (14) and (1) stops by pressure action on the areas (7) so that the cap (6) can be screwed off, the cap (6) including a sealing means, **characterised in that** the sealing means consists of at least one wall element (9) of the skirt (10), where the wall element (9) is connected with the said skirt (10) by means of a number of fracture indication lines (8) or fracture indication parts (8a) connecting the edges of the wall element (9) with the skirt (10).
20
2. Child-resistant screw cap (6) according to claim 1, **characterised in that** the wall element (9) internally includes a barb (11) which by pressure and squeezing and/or turning of the cap (6) interacts with a barb (2) which is disposed on the wall (5) so that the wall element (9) is loosened, and the wall element (9) and the barb (2) are disposed mutually so that the wall element (9) is loosened before barb (14) and barb (1) are passing each other when the areas (7) are subjected to pressure.
25
3. Child-resistant screw cap (6) according to claim 1, **characterised in that** the neck (4) of the container (22) is provided with at least one projection (16) so that the wall element (9) is loosened when the areas (7) are subjected to pressure.
30
4. Child-resistant screw cap (6) according to claim 1, **characterised in that** the barb

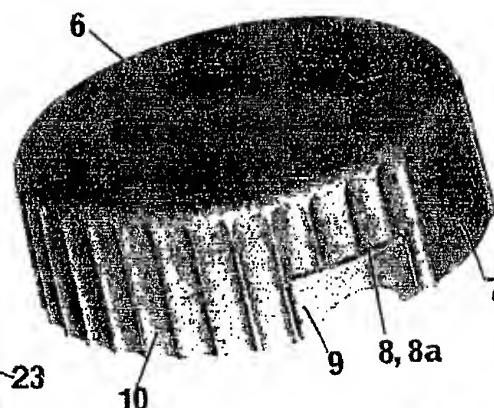
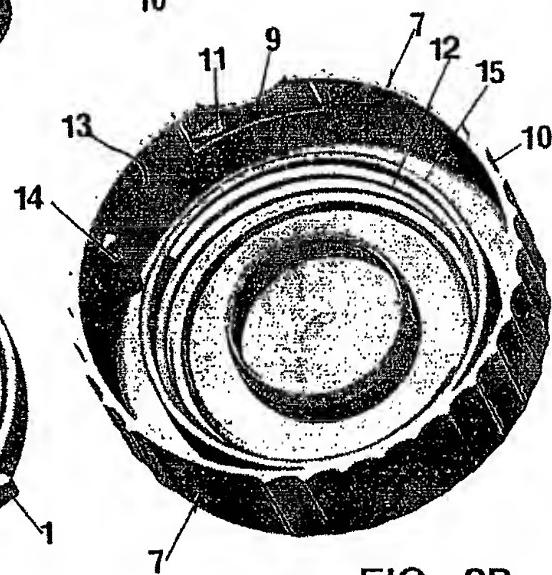
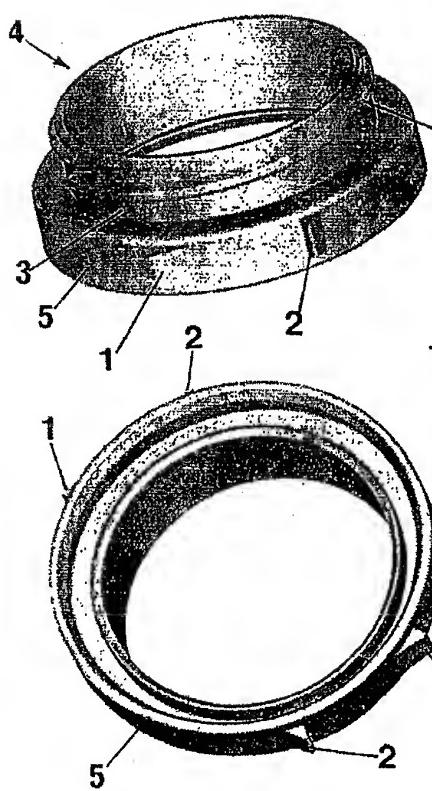
(14) and barb (1) at opposite sides of their respective contact surfaces, which are located in mainly radial planes, have inclined faces forming an acute angle with the adjacent contact surfaces.

- 5 5. Child-resistant screw cap according to claim 2 or 3, characterised in that the screw cap (6) within the skirt (15) is provided with a concentric skirt (21) which is disposed and designed so that its external side bears sealingly against inner side of the container neck (14) in connection with the first stage of the screwing off of the screw cap (6).

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FIG. 1C**FIG. 1B****FIG. 1A**

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FIG. 2A**FIG. 2C****FIG. 2B****FIG. 2D**

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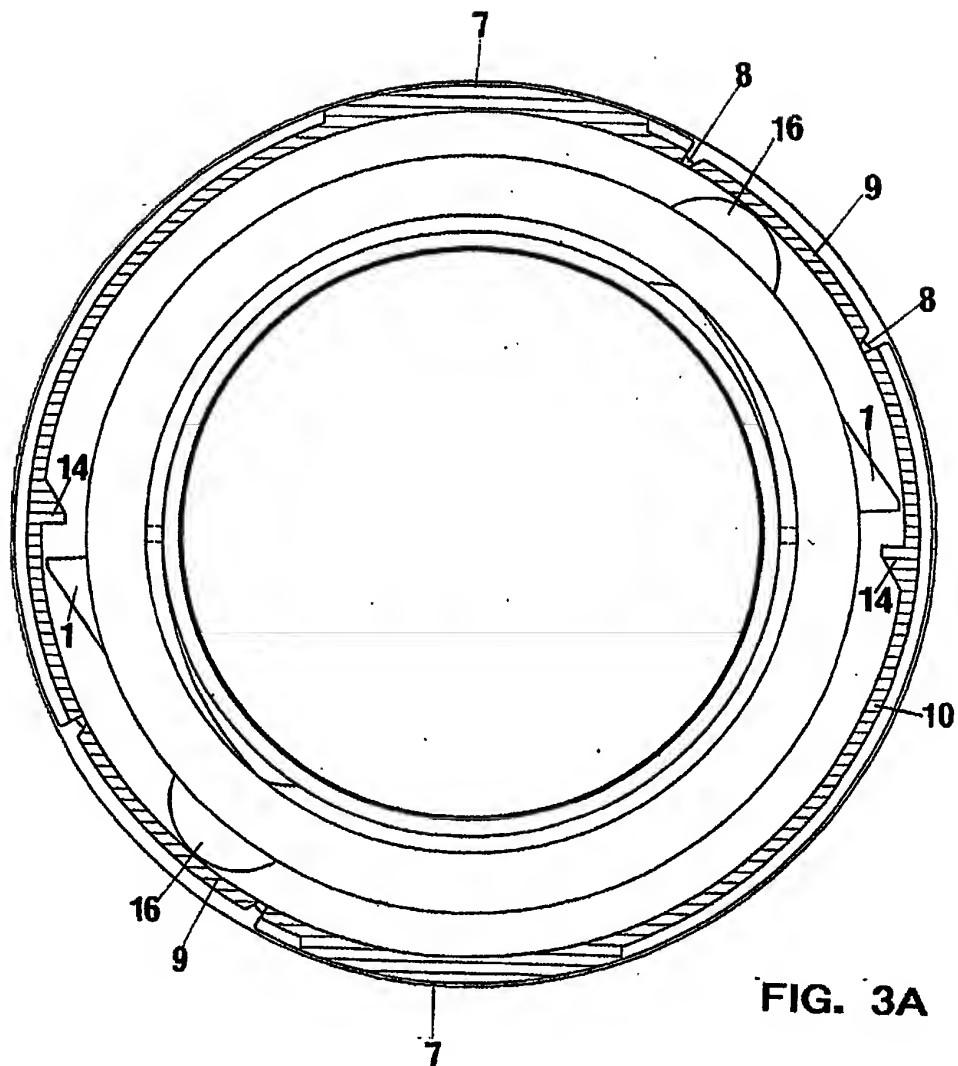


FIG. 3A

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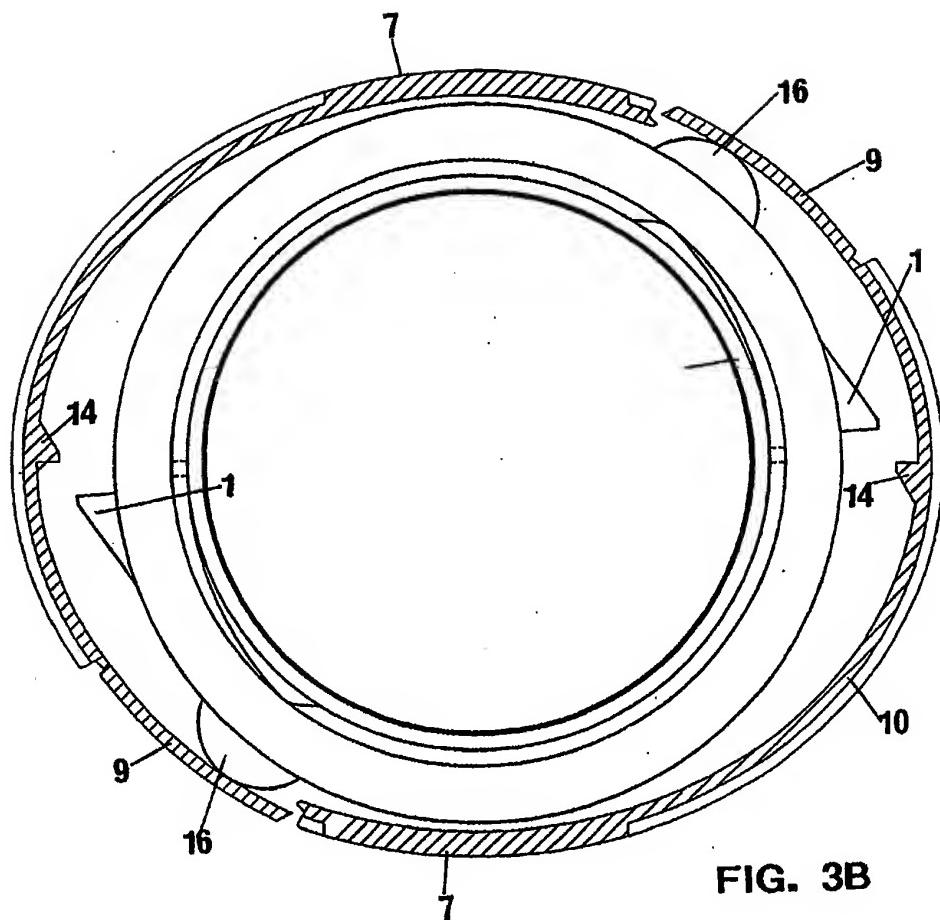
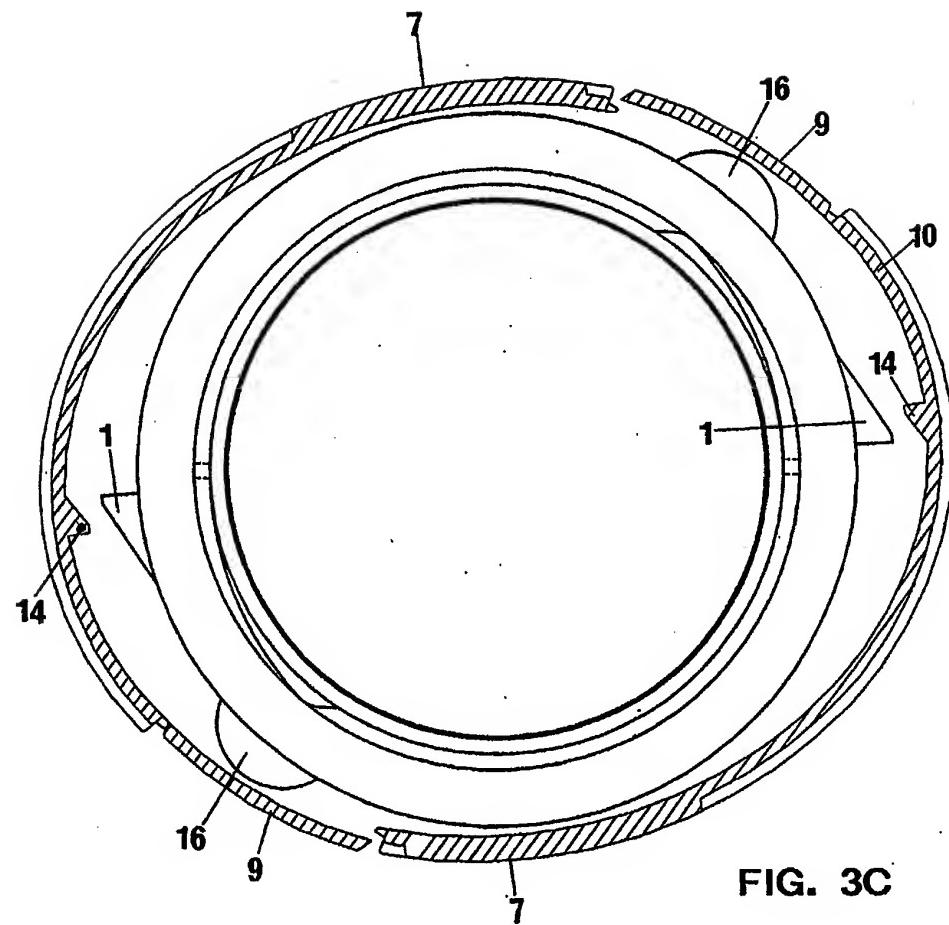
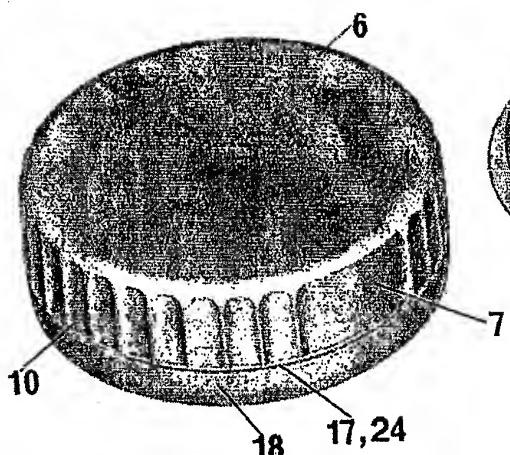
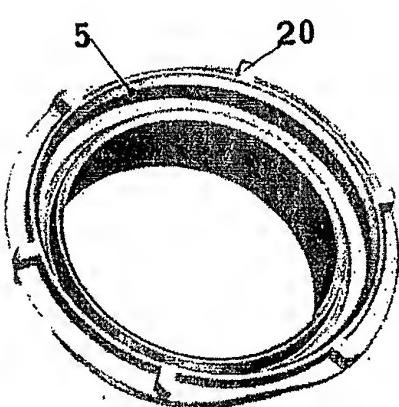
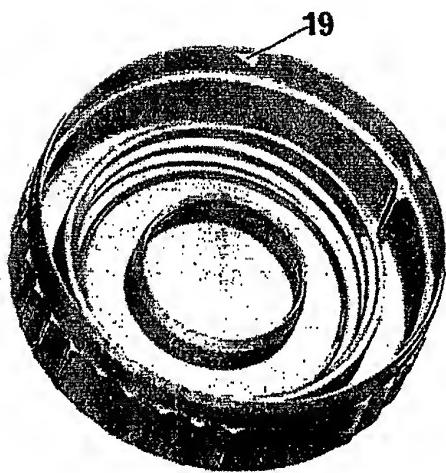
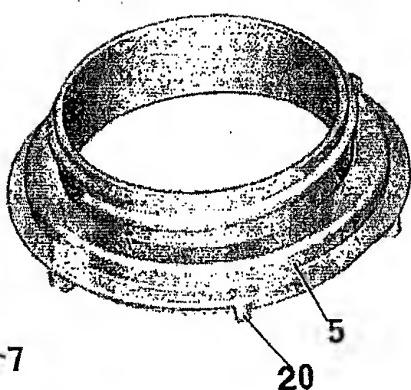


FIG. 3B

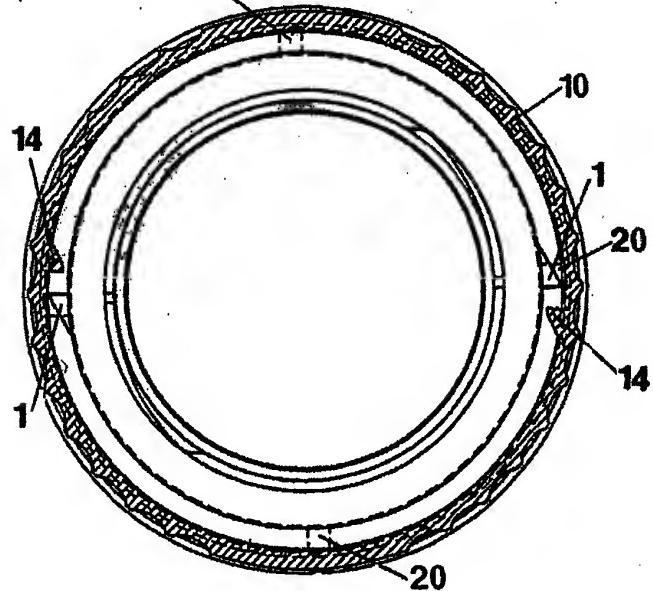
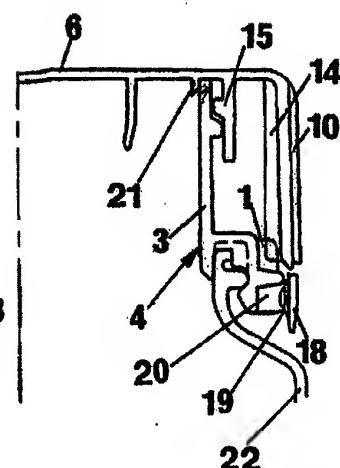
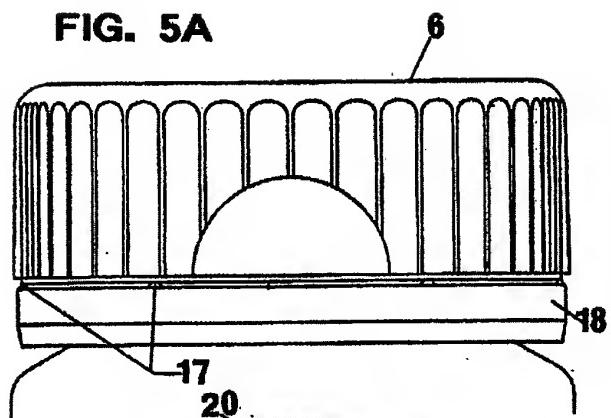
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FIG. 4A**FIG. 4C****FIG. 4B****FIG. 4D**

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FIG. 5C**FIG. 5A****FIG. 5B**

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65D 50/04, B65D 41/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 62-287855 A (CROWN CORK JAPAN), 14 December 1987 (14.12.1987), figure 5 --	1-5

<input checked="" type="checkbox"/>	Further documents are listed in the continuation of Box C.	<input checked="" type="checkbox"/>	See patent family annex.
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"A" document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
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Date of the actual completion of the international search	Date of mailing of the international search report
2 August 2004	03-08-2004
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer William Helin / MRO Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

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US	4967920	A	06/11/1990	NONE			
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US	4117945	A	03/10/1978	AU	509720	B	22/05/1980
				AU	3709978	A	20/12/1979
				CA	1122572	A	27/04/1982
				DE	2828063	A,C	11/01/1979
				GB	1603294	A	25/11/1981
				ZA	7802687	A	27/12/1979
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